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Indian Standard

DETERMINATION OF MAGNETIC MATTER IN ABRASIVES — TEST METHODS

ICS 25.100 70

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1996

Price Group 3

Abrasives Sectional Committee, PE 09

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Abrasives Sectional Committee had been approved by the Production Engineering Division Council.

The presence of magnetic material in an abrasive products adversely affects the performance of abrasive for which it is intended. This Indian Standard specifies the test methods for determination of magnetic matter in artificial abrasives. An electronic instruments test method for determination of magnetic matter in abrasives is also incorporated in this Indian Standard.

In the preparation of this Indian Standard, considerable assistance has been derived from the following Japanese Industrial Standards, issued by the Japanese Standards Association.

JIS R 6003 : 1973	Method for sampling of abrasive grains
JIS R 6121 : 1977	Testing method for magnetic matter in artificial abrasives

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

AMENDMENT NO. 1 MAY 2003
TO
IS 14370 : 1996 DETERMINATION OF MAGNETIC MATTER IN ARTIFICIAL ABRASIVES —TEST METHODS

(*Second cover page, Foreword, para* 2, *line* 1) — Substitute 'product' *for* 'products'.

(*Second cover page, Foreword, para* 2, *line* 3) — Substitute 'instrument' *for* 'instruments'

(*Page* 1, *Table* 1, *Heading*) — Sustitute '**Size of Lot (tonners)**' *for* '**Size of Lot (t)**'.

[*Page* 1, *clause* 4.1.1.2(a), *line* 4] — Substitute 'A low carbon steel piece as per IS 1079 having dimensions as given in Fig. 2 shall be attached to either pole of the magnet' *for* 'A low carbon steel piece as per IS 1079 having dimensions as given in Fig. 2 shall be attached to the either pole of the magnet'.

(*Page* 5, *clause* A.3.3, *line* 1) — Substitute 'search' *for* 'serach'.

(BP 09)

Reprography Unit, BIS, New Delhi, India

Indian Standard

DETERMINATION OF MAGNETIC MATTER IN ABRASIVES — TEST METHODS

1 SCOPE

This Indian Standard specifies the test methods for the determination of the magnetic matter contained in artificial abrasives.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below :

IS No.	*Title*
1079 : 1994	Hot rolled carbon steel sheet and strip (*fifth revision*)
11947 : 1987	Soft magnetic iron rods, bars, flats and sections

3 SAMPLING METHOD

3.1 Size and Number of Samples

The size of a sample shall be minimum 200 g for coarse grits (grit size coarser than # 220) and minimum 20 g for microgrits (grit size finer than # 240). Sampling criteria shall be in accordance with Table 1.

3.2 Gross Sample

The gross sample shall be prepared by mixing the samples taken in accordance with Table 1.

Table 1 Sampling Criteria

Size of Lot (*t*)		Minimum Number of Samples
Over	Up to and Including	
—	0.1	6
0.1	0.3	.8
0.3	1.0	10
1.0	3.0	12
3.0	10.0	14
10.0	30.0	16

4 TEST METHODS

The sample shall be tested in accordance with one of the following methods after selecting the sample as per 3.

4.1 Test Method 1

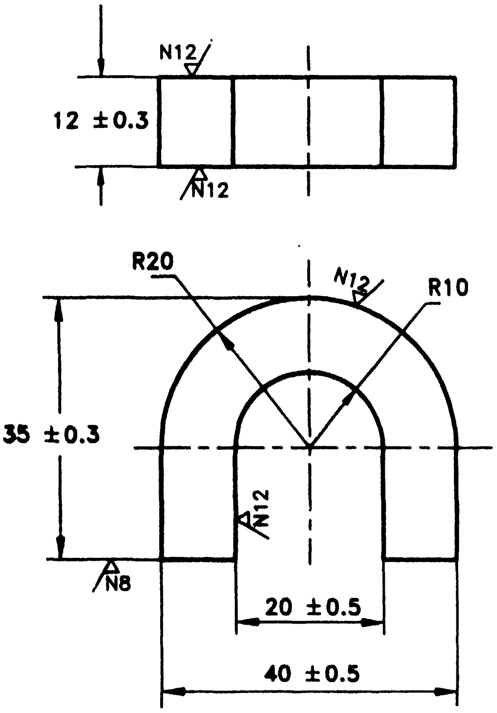
4.1.1 *Test Conditions*

4.1.1.1 The sample taken in accordance with 3 shall be dried in an air bath at 105 ± 5°C for 1 h and then cooled down in a dessicator to bring it to room temperature.

4.1.1.2 *Test equipment*

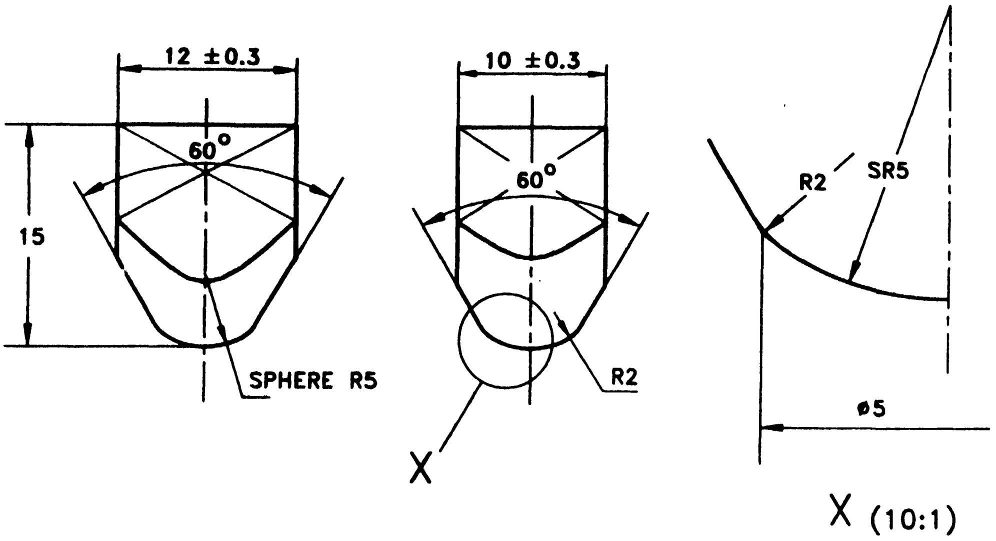
Test equipment shall consist of the following items:

a) *Magnet* — A magnet, made of material as per IS 11947 having the magnetic flux Mx of 2 500 to 3 000 x 10^{-8} Wb, and dimensions in accordance with Fig. 1. A low carbon steel piece as per IS 1079 having dimensions as given in Fig. 2 shall be attached to the either pole of the magnet.



All dimensions in millimetres.

FIG. 1 DIMENSIONS OF MAGNET



All dimensions in millimetres.

FIG. 2 DIMENSIONS OF LOW CARBON STEEL PIECE

b) Method of measuring magnetic flux shall be as given in Annex A.

c) *Parchment paper* – Sheets of parchment paper of approximate 20 cm × 20 cm size.

d) *Balance* – A balance of 100 g weighing capacity and having an accuracy of 1 mg.

e) *Brush* – A brush having widened end.

4.1.2 *Test Procedure*

4.1.2.1 Weigh the gross sample in grams accurately (M), take a sample of about 10 g from it and put it on a sheet of parchment paper.

NOTES

1 A suitable felt shall be laid under the parchment paper before putting the sample on it.

2 The sample may be conveniently spread over the parchment paper with the help of the holder of the brush. For fine grit samples a parchment paper may be wrapped around the holder to prevent sticking of sample on it.

4.1.2.2 Spread the sample uniformly on the parchment paper over an area of 10 cm × 10 cm.

4.1.2.3 Holding the magnet in vertical position move it in such a manner so as to draw two letters S as shown in Fig. 3 and keeping the end of the low carbon steel piece in contact with the sample.

4.1.2.4 Take the magnet carefully away from the sample, and collect the matter attracted by the magnet on other sheet of parchment paper.

NOTE — The matter attracted to the magnet may be removed by means of a brush. The matter so attracted is called the primary attracted matter.

4.1.2.5 Carry out the test as per 4.1.2.3 and 4.1.2.4 each one along lengthwise and widthwise directions, as shown in Fig. 4.

4.1.2.6 Repeat the procedures 4.1.2.2 to 4.1.2.5 ten times, both in lengthwise and widthwise directions and collect the primary attracted matter on a sheet of parchment paper.

4.1.2.7 Spread the primary attracted matter uniformly over an area of 2 cm^2 to 3 cm^2.

4.1.2.8 In the same way as given in 4.1.2.3 and 4.1.2.5, move the magnet twice in such a manner as to draw a circle, and collect the matter so attracted from the primary attracted matter.

NOTE — The matter attracted in this procedure is called the secondary attracted matter.

4.1.2.9 Repeat the procedure 4.1.2.8 five times, and collect the secondary attracted matter on another sheet of parchment paper.

4.1.2.10 Weigh accurately the mass of the secondary attracted matter (m).

4.1.2.11 Repeat the procedures given in 4.1.2.1 to 4.1.2.10 twice and calculate the magnetic matter as given in 4.1.3.

4.1.3 *Test Results*

4.1.3.1 The percentage of the magnetic matter contained shall be calculated in accordance with the following formula. The values obtained shall be

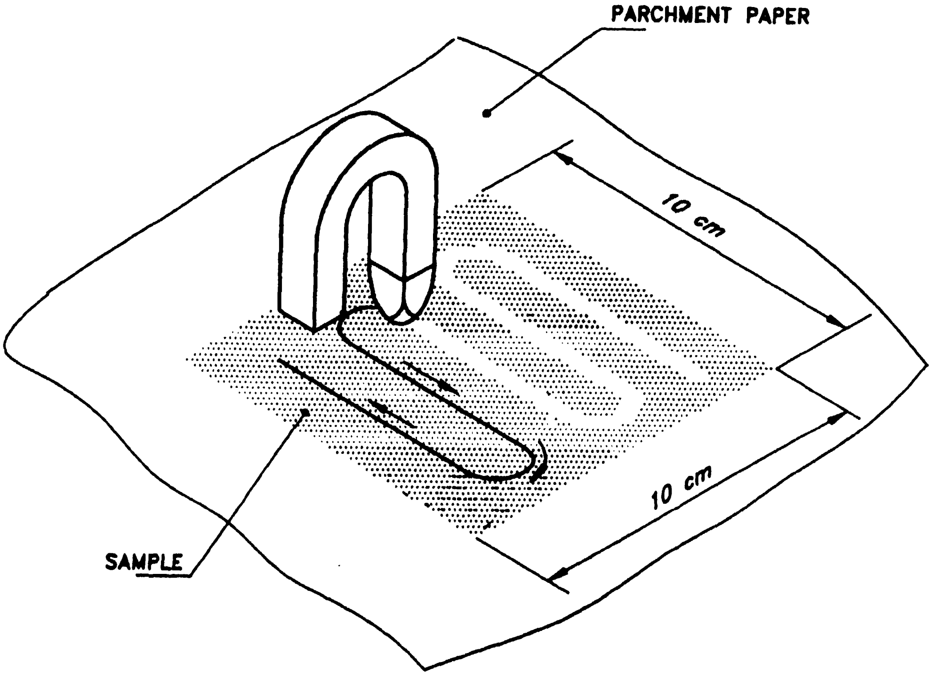


FIG. 3 HOLDING OF MAGNET

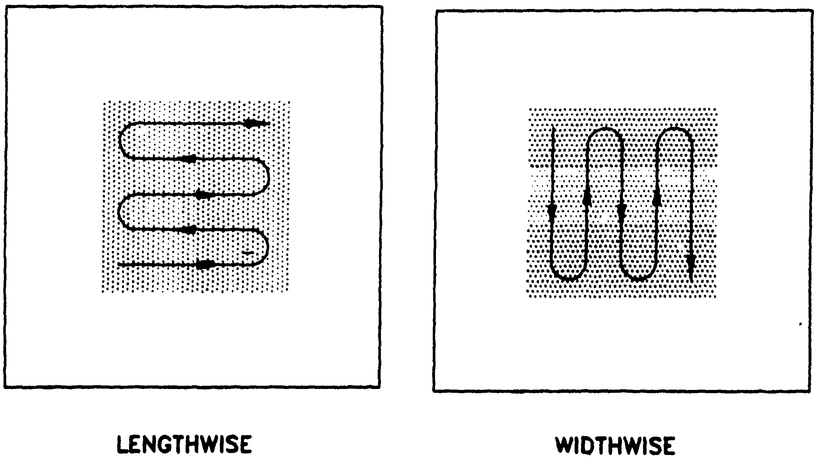


FIG. 4 DIRECTION OF MOVEMENT OF MAGNET

ICS 25.100.70

rounded off to one decimal place:

$$\text{Magnetic matter (percent)} = \frac{m_1+m_2}{M_1+M_2} \times 100$$

where

M_1 = masss of sample taken out at the first time ing,

M_2 = mass of sample taken out at the second time in g,

m_1 = mass of secondary attracted matter at the first time in g, and

m_2 = mass of secondary attracted matter at the second time in g.

4.2 TEST METHOD 2

For determining the amount of magnetic iron content present in the given abrasive grit, the magnetic iron analyzer equipment test method may also be used. The equipment of suitable range for determining magnetic iron content in percent may be used.

4.2.1 *Test Condition*

Magnetic analyzer and standard corning test tube is as shown in the Fig. 5 (for illustration).

4.2.2 *Test Procedure*

4.2.2.1 Switch on the power supply unit of the magnetic analyzer.

4.2.2.2 Select the proper range of magnetic iron (range may be from 0.025 percent to 19.99 percent).

4.2.2.3 Open the cover lid of the test seal for corning glass test tube.

4.2.2.4 Adjust the panel meter to read zero with the help of coarse and fine zero control.

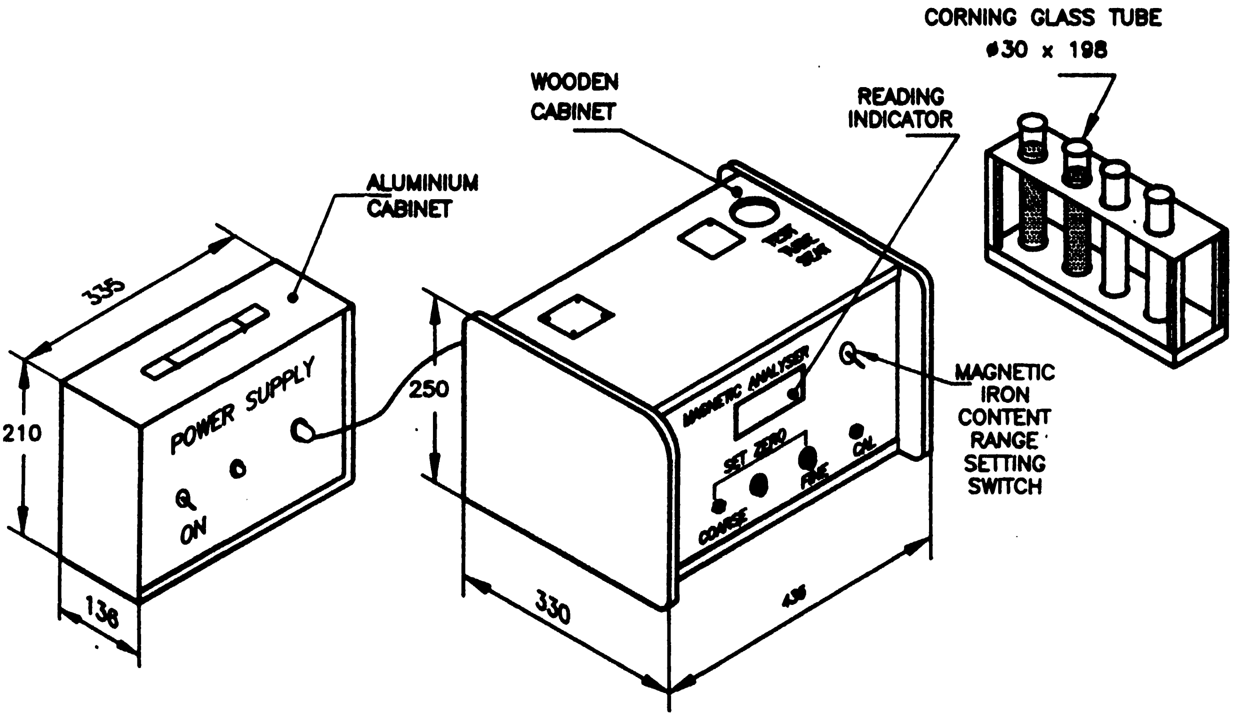
4.2.2.5 Fill sample of abrasive grit material under test in the corning glass tube to full level and place the test tube carefully in the test seat.

4.2.2.6 Observe the reading directly on the panel meter calibrated in percentage.

4.2.2.7 Instrument should be calibrated at regular interval with the standard test samples of known value by taking reading on its panel meter. If its value deviates from the standard sample value, the instrument should be recalibrated to read the exact value with the help of CAL control.

4.2.3 *Result*

From the above test, the magnetic iron contents present in the abrasive grit sample is directly given on the panel meter.



All dimensions in millimetres.

FIG. 5 MAGNETIC ANALYSER

ANNEX A

[*Clause* 4.1.1.2 (b)]

METHOD FOR MEASURING MAGNETIC FLUX OF MAGNET

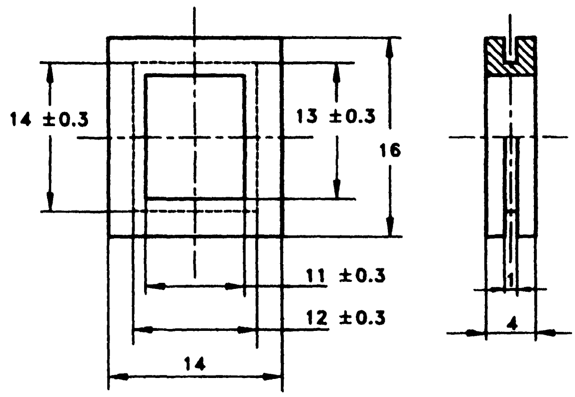
A-1 The strength of magnetic field varies considerably depending on the type of the measuring method. Therefore, in order to maintain the accuracy of the values of magnetic matter, the method for measuring the magnetic flux as described below shall be followed.

A-2 APPARATUS AND EQUIPMENT

A-2.1 Flux Meter

A-2.2 Search Coil

The search coil shall consist of the frame of non magnetic material, such as plastics, of the dimensions shown in Fig. 6, and shall have minimum twenty turns of 0.12 mm dia enamelled copper wire.



All dimensions in millimetres.

FIG. 6 FRAME FOR SEARCH COIL

A-2.3 Magnet

The magnet shall be the same as specified in **4.1.1.2.**

3 MEASURING METHOD

The magnetic flux shall be measured at a place where there is no external magnetic influence at room temperature. The measuring method shall be as given in **A-3.1** to **A-3.4.**

A-3.1 Connect both ends of enamelled copper wire of the search coil to the flux meter.

A-3.2 Insert the magnet attached with low carbon steel piece into the search coil from the end, and set the pointer of the flux meter to zero and keeping their position as given in Fig. 7.

NOTE — This step shall be proceeded at the place where there is no external magnetic influence at room temperature.

A-3.3 Take away the magnet from the serach coil, and read the scale of the flux meter (*Mx*).

A-3.4 Repeat the procedures **A-3.2** and **A-3.3** three times.

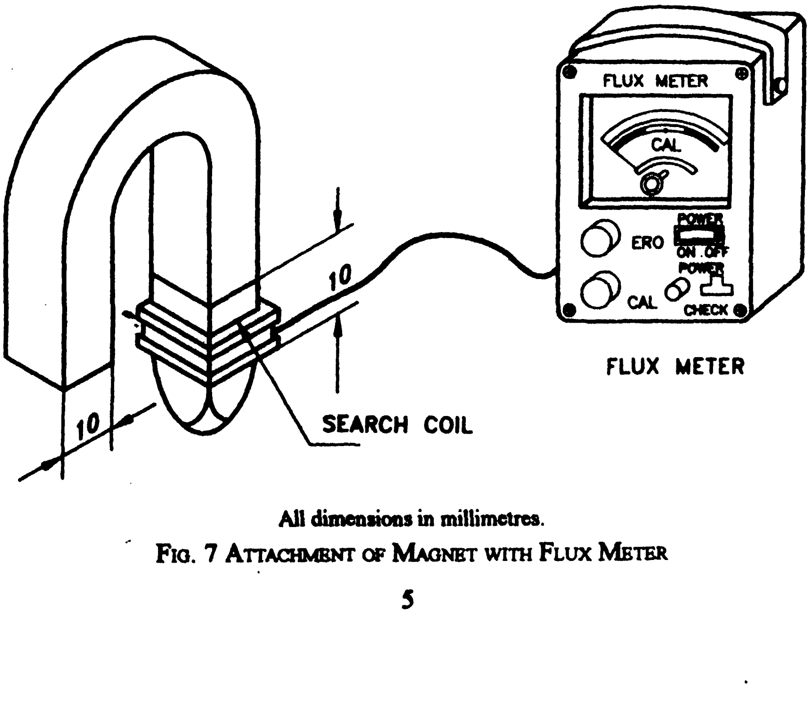
A-4 TEST RESULTS

Calculate the magnetic flux from the following formula:

$$\text{Magnetic flux } Mx \text{ (Wb)} = \frac{Mx_1+Mx_2+Mx_3}{3 \times 20} \times k$$

where

Mx_1, Mx_2 and Mx_3 stand for the respective readings of three measurements on the flux meter. k stands for the coefficient of the flux meter.



All dimensions in millimetres.

FIG. 7 ATTACHMENT OF MAGNET WITH FLUX METER

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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